

AMENDMENT OF THE CLAIMS

1. (Previously presented) A method of detecting and correcting random bit errors in a digital transmission system using a shortened single-bit error correction/double-bit error detection code wherein data is scrambled after said error detection/correction code is applied over a set of data comprising:

obtaining unique syndromes for all combinations of multiplied errors completely confined to a set of data;

obtaining unique syndromes for those combinations of said multiplied errors occurring at the end of said set of data and overlapping a next set of data;

remembering the end unique syndrome types for allowing correction of said next set of data; and

obtaining syndromes for all combinations of said multiplied errors occurring at the beginning of said set of data that are at least unique per said end types.

2. (Original) The method according to claim 1 including the step of selecting a code requiring that shortening is kept minimal.

3. (Original) The method of either claim 1 or claim 2 wherein said error detection/correction code is such that syndromes characterizing bits in error at the beginning of a received descrambled set of data, when the number of said bits in error is less than the number of terms of the scrambling polynomial, need to be unique only per number of bits in error.

4. (Previously presented) The method of claims 1 or 2 wherein said error detection/correction code is an odd-weight extended Hamming code.

5. (Original) The method of claims 1 or 2 wherein each of said set of data comprises at least one 10Gb Ethernet 64B/66B block.

6. (Original) The method of claim 5 further comprising the step of inserting at least one control bit in said set of data, between each of said 10Gb Ethernet 64B/66B blocks, after said set of data has been scrambled.

7.-9. (Cancelled)

10. (Currently Amended) ~~The method of claim 9 further including:~~ A method for recovering information encoded in a received data packet, said received data packet being scrambled and containing shortened forward error correction bits, said method comprising:

descrambling said received data packet;

computing a syndrome of said descrambled received data packet, wherein the syndrome is computed via the shortened forward error correction bits of the received data packet;
and

if said syndrome is an all-zero syndrome, extracting the data from said received data packet;

else if said syndrome is not an all-zero syndrome, determining the state of a status flag;

if said status flag is set to a first logical value, determining the number of bits in error in said received data packet according to said syndrome
and,

if the number of bits in error in said received data packet is equal to the number of terms of the scrambling polynomial, extracting the data from said received data packet and correcting said extracted data;

else if the number of bits in error in said received data packet is less than the degree of the scrambling polynomial, setting said status flag to a second logical value for one packet cycle and setting a value, associated to said status flag, to the degree of the scrambling polynomial minus the number of bits in error in said received data

packet, extracting the data from said received data packet and correcting said extracted data.

11. (Currently Amended) The method of claim 10 still further including:

else if said status flag is set to a second logical value, determining ~~[[if]]~~ the number of bits ~~[[in]]~~ from error in said received flag and, if the number of bits in error in said received data packet is equal to said value associated to said flag, extracting the data from said received data packet and correcting said extracted data.

12. (Currently amended) The method set forth in claims ~~9 or~~ 10 wherein correcting said extracted data being is done according to a predefined forward error correction code.

13. (Previously presented) An apparatus to correct an error in a data packet, the apparatus comprising:

a first circuit to generate a syndrome via forward error correction bits of the data packet, wherein the forward error correction bits are selected via a shortened group of vectors from an odd-weight group of vectors, wherein further the shortened group of vectors is based upon terms of a scrambler polynomial;

a second circuit to detect whether an end-of-packet error occurs in a previous data packet which precedes the data packet;

a third circuit to determine when multiplied errors of the error are confined to the data packet and when the multiplied errors affect a subsequent data packet which follows the data packet; and

a fourth circuit to correct the error when the generated syndrome differs from an all-zero syndrome, wherein the fourth circuit is arranged to:

correct the error of the data packet when no error occurs in the previous data packet and the multiplied errors are confined to the data packet;

correct the error of the data packet and set a flag which corresponds to a type of the error of the data packet when at least one of the multiplied errors affects the subsequent packet packet; and

correct the multiplied errors of the subsequent data packet based upon the set flag and the type of error of the first data packet.

14. (Previously presented) The apparatus of claim 13, further comprising a fifth circuit to receive the data packet.

15. (Previously presented) The apparatus of claim 13, further comprising a sixth circuit to decode the data packet when the packet is scrambled via the scrambler polynomial.

16. (Previously presented) The apparatus of claim 13, wherein the first circuit comprises an H-Matrix of the shortened group of vectors.

17. (Previously presented) The apparatus of claim 13, wherein the shortened group of vectors comprise odd-weight vectors α^0 through α^{914} from the group of odd-weight vectors α^0 through α^{1022} .

18. (Previously presented) The apparatus of claim 13, wherein the scrambler polynomial comprises $X^{58} + X^{19} + 1$.

19. (Previously presented) The apparatus of claim 13, wherein the shortened group of vectors corresponds code generating polynomial $G(x) = (X+1)(X^{10} + X^9 + X^7 + X^6 + X^4 + X^1 + 1)$.

20. (Previously presented) The apparatus of claim 13, wherein the type of the error of the data packet comprises a double bit end-of-packet error.

21. (New) The method set forth in claim 10 further comprising detecting an uncorrectable error if said status flag is set to said first logical value and the number of bits in error in said received data packet is greater than the number of terms of the scrambling polynomial.

22. (New) The method set forth in claim 11 further comprising detecting an uncorrectable error if said status flag is set to said second logical value and the number of bits in error in said received data packet is different from said value associated to said flag.

23. (New) A method for recovering information encoded in a received data packet, said received data packet being scrambled and containing shortened forward error correction bits, said method comprising:

descrambling said received data packet;

computing a syndrome of said descrambled received data packet, wherein the syndrome is computed via the shortened forward error correction bits of the received data packet;
and

if said syndrome is an all-zero syndrome, extracting the data from said received data packet;

else if said syndrome is not an all-zero syndrome, determining the state of a status flag;

if said status flag is set to a first logical value, determining the number of bits in error in said received data packet according to said syndrome
and,

if the number of bits in error in said received data packet is equal to the number of terms of the scrambling polynomial, extracting the data from said received data packet and correcting said extracted data according to a predefined forward error correction code.